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ABSTRACT

A study was conducted to analyze the relationship between the first-semester grade point average (GPA) of nursing students at Vermont College and their scores on the Nursing State Board Examination. The study sought to determine whether a GPA of 1.75 (which is currently required for progression in the nursing program beyond the first semester) could predict success in the State Board Examination. GPA's were obtained for each freshman student nurse in 1976 and 1977 (N=108) and nursing examination scores were determined for each 1978 and 1979 graduate (N=76), and matching scores and GPA's were correlated. The study revealed that while there was a significant relationship between GPA and Nursing Board scores, a GPA of 1.75 failed to predict success in the examination. However, on the basis of a linear regression analysis, failure in the Nursing Board exams could be predicted with a 95% level of confidence for those students with a first-semester GPA below 1.5. On the basis of these findings, it was recommended that the GPA required for continuation beyond the first semester be lowered from 1.75 to 1.50. The study report includes a review of the literature on GPA and other predictors of student success and a bibliography. (HB)

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AN ANALYSIS OF THE RELATIONSHIP BETWEEN THE FIRST SEMESTER GRADE POINT AVERAGE AND THE STATE BOARD NURSING SCORES OF VERMONT COLLEGE GRADUATES

by

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ABSTRACT

AN ANALYSIS OF THE RELATIONSHIP BETWEEN THE FIRST SEMESTER GRADE POINT AVERAGE AND THE STATE BOARD NURSING SCORES OF VERMONT COLLEGE GRADUATES

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Sister St. Thomas

The purpose of this study was to analyze the relationship between the first-semester grade point average and the State Board nursing scores of Vermont College nursing graduates. The population consisted of 76 graduates from the nursing classes of 1978 and 1979. The names, the freshman GPA averages and State Board nursing scores were obtained from the Registrar and Nursing Department files. The Pearson-Product-Moment correlation was used to determine the relationship between the two sets of data. The results indicated that there was a significant relationship between GPA and the Nursing Board scores. The data was then tested to determine whether a GPA of 1.75 predicted success on the Nursing Board scores. A linear regression analysis was done. It was found that a GPA of 1.75 failed to predict success on the Nursing Board test scores. A recommendation was made that consideration be given to lowering the GPA for progression to second semester nursing from 1.75 to 1.5 at the end of the first semester of nursing.

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The Statement of the Problem

The purpose of this study was to determine the relationship that existed between the first-semester grade point average and the State Board Nursing Scores of graduates at Vermont College.

The need for this study existed because many students were failing Nursing State Board licensure examinations. A minimum grade point average of 1.75 was required for progression in the program beyond the first semester. The nursing faculty debated lowering or raising the GPA but were without adequate research to substantiate a decision. This study involved 76 graduates from the nursing classes of 1978 and 1979.

The Hypothesis

The Null Hypothesis (H_o):

There was no significant statistical relationship between first semester grade point averages and the State Board nursing scores of the 1978-79 nursing graduates.

The Alternative Hypothesis (H_a):

The grade point averages attained at the end of the first semester had a significant positive relationship to the State Board nursing scores of the 1978-79 nursing graduates.

Background and Significance

As with other colleges in the 80's, the focus of Vermont College of Norwich University was on student attrition and retention. The

Nursing Department of Vermont College comprises approximately one third of the Vermont College student population; consequently, any attrition in the nursing department caused a major effect on the entire college.

The nursing department had placed considerable emphasis on the GPA as a predictor of success in academic achievement in the Vermont College nursing program. Only students who had a grade point average of 1.75 or higher at the completion of the first semester were allowed to continue in the nursing program.

The question arose whether a GPA was a predictor of success in passing the registered nurse licensure examination. The author believed the following question merited an answer: To what degree could the nursing department be assured that a GPA would predict academic achievement and passage of the registered nurse licensure examination? The significance of answers to this question was to provide data for a valid base for establishing a GPA that predicted success in passing State Board nursing exams and retention of maximum numbers of students.

This study was appropriate for the module on Applied Educational Research and Evaluation because it provided a researchable problem that required statistics and appropriate research tools. The results of this study were applicable to the author's field of work and served the institution by aiding retention of students.

This researcher could not find any literature specific to first semester GPA and nursing licensure examination scores. Therefore, one had to draw from other disciplines and nursing literature and make conclusions about the predictability of GPA and academic success.

"Traditionally, educators have used grade point average (GPA) as the operational definition of school success, but most realize that this is not a completely adequate definition. Other criteria measures, such as graduation versus withdrawal, are possible."[1]

Too often students never realize success in a given field of study because of rules, regulations, or policies. Nursing is no exception to this truism. Certainly, "decisions are subject to two kinds of errors: (1) false positive, that is predicting failure when success would have occurred; and (2) misses, that is predicting success when failure is the result."[2]

In this computer age one expects accuracy and validity when dealing with any measurements, and academic achievement is no exception. Students expect it and deserve it. John Heywood observes that "teachers often ascribe meaning to marks which is not justified, even by the claim that they are maintaining standards."[3] If "validity is the degree which an instrument measures that which it purports to measure (or predicts that which it purports to predict),"[4] then the use of GPA for progression in any field should be a reliable instrument for predictability of academic achievement. Carrying this one step further, one could say that academic success is predictable provided the GPA is of sufficient value to show a meaningful relationship between GPA and success.

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[1]William H. Mehrens and Irvin J. Lehman, Measurement and Evaluation in Education and Psychology, Holt, Rinehart & Winston, Inc., 1973, New York, p. 125.

[2]Ibid., p. 133.

[3]John Heywood, Assessment in Higher Education, John Wiley & Sons, 1977, New York, p. 26.

[4]Marion F. Shaycoft, Handbook of Criterion-Referenced Testing, Garland STPM Press, New York, 1979, p. 93.

A paper read in 1975 at the Conference on Selection and Educational Differentiation in Berkley, California, provides data tying the medical college admission test to other tests and to general population norms.[5] In this study, the undergraduate GPA showed a direct relationship to performance on the medical college admission test and predictability for acceptance into medical school. From this, one could deduct reliability and validity for application to similar situations. It seemed to this researcher that the GPA of nursing students at Vermont College was a predictor of performance on the graduate nurse licensure examination.

Kester[6] observes that research indicates that most colleges potential drop-outs could be identified before they drop out. If this is true and as Lynch[7] asserts that the large majority of reasons for dropping out lie in areas over which the colleges assume control and responsibility, then colleges must research closely what they are doing to promote academic success and retention of students. It would be a sad commentary on education if educators were the direct cause for academic failure whether that failure be from too great an expectation such as too high a GPA for progression from course to course or from setting standards so low that academic failure is bound to occur.

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[5]Ronald R. Morgan, "Prediction of College Achievement Using the Need Achievement Scale from the Edwards Personal Reference Schedule," Educational and Psychological Measurement Journal, 1975, p. 387.

[6]Donald L. Kester, "California Community College Stop-Outs: A Comparison of the Three Nor Cal CORE Follow-up Studies," Sacramento, 1971.

[7]Donald F. Lynch, "An Analysis of Drop-Outs in Selected Public Junior Colleges of Florida," The Pennsylvania State University, (Unpublished doctoral dissertation--microfilm), August, 1959.

Sawyer and James[8] in a study done in 1979 found that freshmen grade averages could be predicted. They developed a prediction equation based on American College Tests and high grades. Application of their equation showed that despite a number of variables (e.g. student abilities and grading practices) the grades remained quite stable.

Prediction of achievement in nursing education was addressed in research done by Frances Seither in 1980. Among her conclusions she stated:

> The grade point average in nursing courses was found to have the highest correlation with the cummulative GPA; however, this finding must be viewed with caution. The fact that nursing courses make up the largest single block of credits within the total curriculum, these courses would have a marked impact upon the cumulative grade point average.[9]

If one were to compare State Board examination scores with National League of Nursing Achievement Test scores, according to Melcolm and Bausell, the relationship would be remarkably constant across curricula and time.[10] Accepting Tuckman's[11] categorization of variable as independent and dependent, one concludes that the value of the dependent variable in this study, namely, state board exam scores, is dependent on the first semester GPA or independent variable. Furthermore, one has to look for means to measure what is the appropriate

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[8]Richard Sawyer and Maxey E. James, The Validity Over Time of College Freshmen Grade Prediction Equations, ED 185-896, October 1979.

[9]Frances F. Seither, "Prediction of Achievement in Baccalaureate Nursing Education," Journal of Nursing Education, Slack, Inc., New Jersey, Vol. 19, No. 3, March 1980, p. 34.

[10]Norma Melcolm and R. Barker Bausell, "The Prediction of State Board Test Pool Examination Scores Within an Integrated Curriculum," Journal of Nursing Education, Slack, Inc., New Jersey, Vol. 20, No. 5, May 1981, p. 28.

[11]Bruce W. Tuckman, Conducting Educational Research, New York: Harcourt, Brace & Jovanovich, 1973.

GPA to assure academic success and retention of students. This practicum was intended to be a step in that direction.

In a review of the literature on the topic of using the GPA as a predictor of success, it became evident that disciplines have used it for this purpose in the past and there was every indication that the GPA would continue to be used as a means of predicting success.

Definitions

Grade point: Determined by changing the letter grade submitted by faculty to a numerical equivalent as stated in college policy, e.g. A equals 4.0, B equals 3.0, C equals 2.0, D equals 1.0, and F equals 0.

Grade point average (GPA): Determined by adding the number of grade points for all courses taken and dividing by the number of credits attained by the student.

Nursing State Board Examination: Examination given by National League of Nursing within each state at the completion of an approved program of nursing that tests basic nursing knowledge.

Nursing State Board Examination Score: Success determined by obtaining a raw score of 350 or higher.

Limitations

1. The study was limited to Vermont College nursing graduates of the classes of 1978 and 1979.

2. Some states at the request of students did not release State Board scores; consequently, a few scores were not available.

3. Because a number of students completed the first semester and did not complete the program (or take the State Board examination),

their mean GPA might have been significantly different from the mean GPA in the sample population.

Basic Assumption

Grades: The assumption here was that all data from the registrar's records and nursing records were an accurate reporting of GPA and State Board test scores. It was assumed that the records provided were appropriate data for this study. One further assumed that State Board Licensure examination scores were valid and reliable and that GPA did accurately measure academic performance.

Procedures for Collecting the Data

The procedures for collecting the data were as follows:

1. The name and grade point average (GPA) for each freshman student nurse in 1976 and 1977 were obtained from the Registrar's office.
2. The name of each graduate from the nursing program in 1978 and 1979 was obtained from the Registrar's office.
3. The State Board nursing examination score for each 1978 and 1979 graduate was obtained from the Nursing Department files.
4. The corresponding GPA and State Board examination score were matched with each name. Those unable to be matched were discarded, (e.g. withdrawals from the nursing program) leaving 76 pairs of data from that number of students.

The population used for the study was the nursing program graduates in 1978 and 1979 for whom State Board examination scores were available. The total number was 76.

Table I

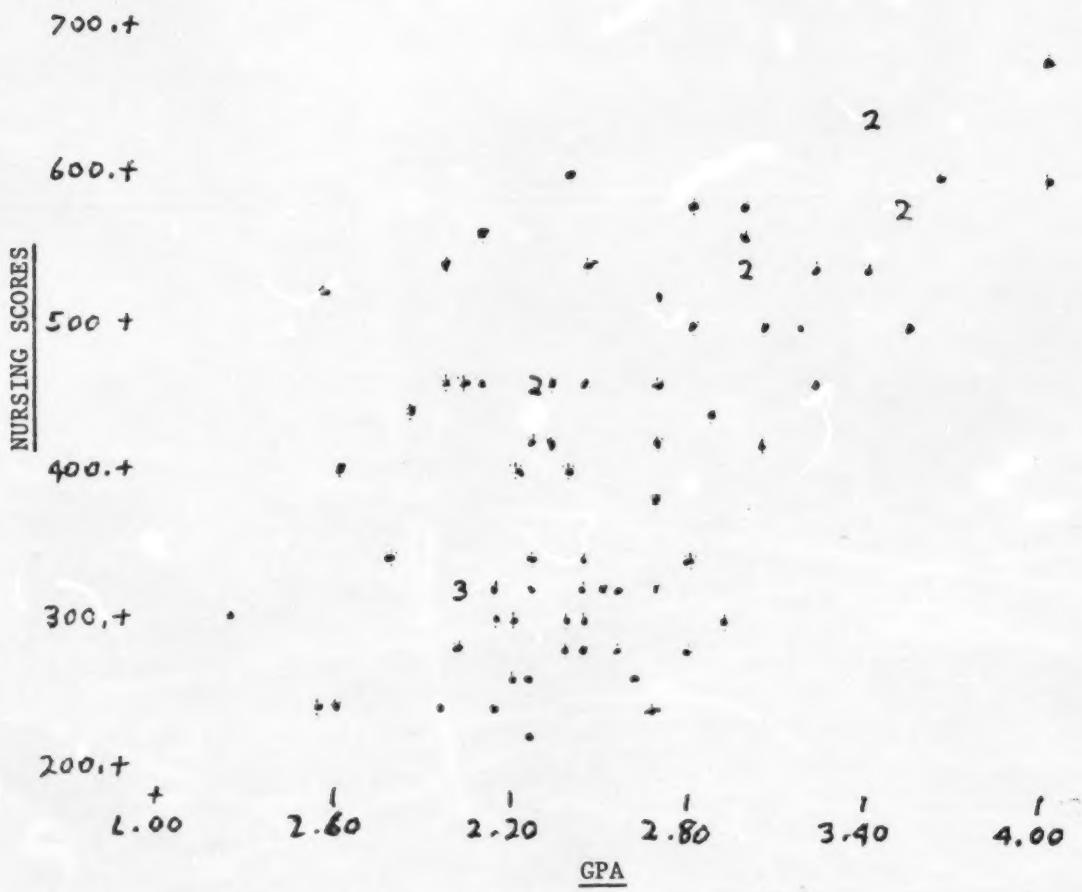
A COMPARISON OF STATE BOARD EXAMINATION SCORES
OF 1978 AND 1979 GRADUATES WITH THEIR
FIRST-SEMESTER GRADE POINT AVERAGES

Student Number	Nursing State Board Score	GPA of First Semester
1	254	2.29
2	469	2.46
3	295	2.47
4	341	1.77
5	287	2.81
6	322	2.53
7	579	3.54
8	570	3.54
9	468	2.00
10	397	1.60
11	362	2.92
12	388	2.71
13	467	2.35
14	321	2.54
15	305	1.23
16	395	2.40
17	426	2.24
18	574	2.79
19	318	2.00
20	688	4.00
21	591	4.00
22	274	2.00
23	425	3.06
24	235	1.94
25	506	3.17
26	259	2.18
27	453	1.94
28	326	2.25
29	225	2.24
30	307	2.19
31	607	3.65
32	432	1.85
33	248	2.71
34	466	2.08
35	504	3.06
36	572	3.00
37	535	2.47
38	547	3.40
39	543	3.00
40	545	3.24

Table 1 (continued)

Student Number	Nursing State Board Score	GPA of First Semester
41	311	2.00
42	408	2.18
43	548	1.95
44	236	1.57
45	520	1.53
46	239	2.14
47	314	2.00
48	457	2.24
49	342	2.29
50	324	2.14
51	458	3.24
52	426	2.71
53	553	2.06
54	272	2.38
55	316	2.47
56	294	2.12
57	284	2.47
58	495	2.82
59	415	2.35
60	341	2.79
61	275	2.56
62	534	3.00
63	434	2.88
64	637	3.40
65	504	3.54
66	461	2.69
67	557	3.00
68	463	2.24
69	339	2.43
70	237	1.56
71	265	2.63
72	513	2.71
73	326	2.66
74	295	2.40
75	648	3.38
76	590	2.40

SCATTER PLOT DIAGRAM



Procedures for Treating the Data

The required names and GPA of first-semester freshmen were obtained from the Registrar's office. The list obtained gave a total number of 108 students. These names were cross matched with the names of the 76 graduates in 1978 and 1979 and unmatched names were discarded. The 76 names were alphabetized and a number was assigned to each.

Table 1 on pages 8 and 9 presents the resulting data. Table 2 on page 10 shows scatter plot diagram of data.

The null hypothesis (H_o) tested was: there was no significant correlation between the first-semester grade point averages and the State Board examination scores of the 1978 and 1979 graduates.

The Pearson-Product Moment was used to establish the relationship between the two sets of paired data. This formula measured the degree of relationship.

$$r = \frac{n\Sigma xy - (\Sigma x)(\Sigma y)}{\sqrt{\left[n\Sigma x^2 - (\Sigma x)^2\right]\left[n\Sigma y^2 - (\Sigma y)^2\right]}}$$

The T-test was used to measure the probability that the value of the correlation of all the paired data sets in the universe of sets was in fact 0 (zero); and the observed value of r for the sample of 76 varied from the expected value of zero due to chance.

$$t = r\sqrt{\frac{(n-2)}{(1-r^2}}$$

Results

Table I on pages 8 and 9 describes the data that resulted from steps one, two, three, and four previously outlined in the procedures for collecting data. Table II and Table III show comparative data using both 1.75 and 1.50 grade point averages.

Table II

A COMPARISON OF 1.75 GRADE POINT AVERAGE WITH STATE BOARD EXAMINATION SCORES

1.75 GPA	Passed Board Exams		Failed Board Exams		Totals	
Met	Number	Percent	Number	Percent	Number	Percent
GPA Standard	42	59.2	29	40.8	71	100
Did Not Meet GPA Standard	2	40.0	3	60.0	5	100
TOTAL	44	57.9	32	42.2	76	100

Table III

A COMPARISON OF 1.50 GRADE POINT AVERAGE
WITH STATE BOARD EXAMINATION SCORES

1.50 GPA	Passed Board Exams		Failed Board Exams		Totals	
	Number	Percent	Number	Percent	Number	Percent
Met GPA Standard	44	58.7	31	41.3	75	100
Did Not Meet GPA Standard	0	0.0	1	100	1	100
TOTAL	44	57.9	32	42.2	76	100

The Pearson-Product-Moment correlation (r) was calculated with GPA = x and Board Scores = y. The calculation yielded r = +.528, significant at the 0.01 level (where $t = r\sqrt{(n-2/(1-r2)}$. Therefore, H_o was rejected (that there was no significant positive relationship between GPA (as defined) and nursing board scores.) Therefore, the alternative hypothesis (H_a) was accepted.

Discussion, Implications, and Recommendations

In the author's efforts to say something about the relationship of academic performance and nursing board scores, it was found that a X^2 (chi square) or $\emptyset$ (phi coefficient) was inappropriate because it tended to show at what standard of academic performance one could most accurately predict that a student would pass the nursing board exam. These methods set a minimum standard for GPA at 2.7 and would allow prediction of passing nursing board scores at a 95% level of confidence.

Rather, we would like to be able to predict the lowest level of academic achievement below which we can predict, at a 95% level of confidence, that students will fail the nursing board examination.

Therefore, the correct test was a linear regression analysis to predict at what GPA a student could be classified as unable to pass the nursing board examination. The linear regression evaluated the data in terms of its array on a coordinate-axis plane and calculated that line which is closest to all points minimizing the square of the value of the units of distance of each point to the regressed line, (the least square fit). The line is defined as Y=A+Bx. The results were: B = 124.62, A = 84.53, Sy.x= 115.7 (standard error of estimate).

The linear regression analysis predicts with a 95% level of confidence that students with a GPA below 1.5 would fail the nursing board exams.

This study implied that if the nursing department continued to set the GPA of 1.75 for progression from first semester to second semester nursing, it could fail some students who might pass State Board licensure examination.

This research was presented to the nursing faculty and chairman for consideration and deliberation. Based on the experimental design, the author recommended that the GPA standard of the Vermont College Nursing Program for first semester students be lowered to 1.50. The effect of implementation of this recommendation would be to assure that only those students who would be likely to fail the Nursing Board exams would be required to leave the program after their first semester. The statistical data have been so treated as to allow this prediction at the 95% level of confidence. As a practical matter, this recommendation also maximizes the number of students who will be allowed to continue their studies but will eventually fail their board exams. This compromise is acceptable.

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